

CLAIMS

1. A cell culture substrate coated with a hydrophobic binding-absorptive polymer having a hydrophobic linear skeleton and a functional group that can react to a protein or a peptide in a molecule.
2. The cell culture substrate according to claim 1, wherein a base material of the cell culture substrate comprises a biobased polymer, plastic, natural or synthetic rubber, an inorganic material or metal.
3. The cell culture substrate according to claim 2, wherein the biobased polymer is collagen, gelatin, cellulose, agarose, alginic acid, chitin, chitosan, or a biodegradable polymer, which is, polylactic acid, polybutylene succinate, or polycaprolactone.
4. The cell culture substrate according to claim 2, wherein the plastic is a thermoplastic resin or a thermosetting resin.
5. The cell culture substrate according to claim 4, wherein the thermoplastic resin is an acryl resin, a polyvinyl chloride resin, a polyethylene resin, a polystyrene resin, a polypropylene resin, a polymethylpentene resin or a fluorocarbon resin.
6. The cell culture substrate according to claim 4, wherein the thermosetting resin is a phenolic resin, a urea formaldehyde resin, an epoxy resin, a melamine resin or a silicone resin.

7. The cell culture substrate according to claim 2, wherein the synthetic rubber is butadiene-styrene rubber, butadiene-acrylonitrile rubber, butyl rubber, polysulfide-based synthetic rubber, fluorocarbon rubber or silicone rubber.

8. The cell culture substrate according to claim 2, wherein the inorganic material is glass, hydroxyapatite, IC substrate or carbon nanotube.

9. The cell culture substrate according to claim 2, wherein the metal is inert gold, platinum, titanium, indium, or an oxide thereof which is titanium oxide, indium oxide, or ITO (indium tin oxide).

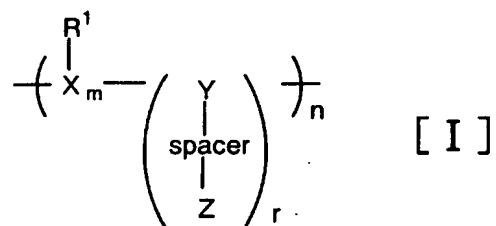
10. The cell culture substrate according to claim 1, wherein the cell culture substrate comprising a base material according to claims 2 to 9 is a well, a printed-wiring board, or an artificial organ.

11. The cell culture substrate according to claim 10, wherein the artificial organ is an artificial blood vessel, an artificial heart lung, or an artificial kidney.

12. The cell culture substrate according to claim 1 or 10, wherein the cell culture substrate is a well comprising silicone as a base material.

13. The cell culture substrate according to any one of claims 1 to 12, wherein the hydrophobic binding-adsorptive polymer is

shown by the following formula [I]:



(wherein, X denotes CH or NHCHCO, Y denotes CH or NHCR²CO, R¹ denotes H, alkyl group of carbon number 1 to 10, alkoxy group of carbon number 1 to 10, aryl or aralkyl group of carbon number 6 to 10, or aryloxy or aralkyloxy group of carbon number 6 to 10, R² denotes H or alkyl group of carbon number 1 to 10, Z denotes a functional group (reactive group) and is optionally bonded to X reciprocally, spacer denotes (-CH₂-)^p or (-NHCHR³CO-)^q, R³ denotes H or alkyl group of carbon number 1 to 10, m denotes an integral number greater or equal to 1, n denotes an integral number between 100 and 20000, p and q independently denote 0 or integral numbers 1 to 8, and r denotes an integral number greater or equal to 1).

14. The cell culture substrate according to claim 13, wherein the hydrophobic binding-adsorptive polymer shown by the formula [I] is a copolymer made of a vinyl-based compound and maleic anhydride.

15. The cell culture substrate according to claim 14, wherein the vinyl-based compound is methyl vinyl ether, ethyl vinyl ether, butyl ether, hexyl vinyl ether or styrene.

16. A solidified preparation of a cell adhesion protein or peptide wherein the cell adhesion protein or peptide is bound to the cell culture substrate according to any one of claims 1 to 15.
17. The solidified preparation according to claim 16, wherein the binding is covalent bonding formed by a reaction between a functional group, which is capable of reacting to a protein or a peptide, of a hydrophobic binding-adsorptive polymer and a reactive group of a cell adhesion protein or peptide.
18. The solidified preparation according to claim 17, wherein the covalent bonding is amide bonding.
19. The solidified preparation according to any one of claims 16 to 18, wherein the cell adhesion protein is fibronectin (FN), collagen (Col), laminin (LN) or vitronectin (VN).
20. The solidified preparation according to any one of claims 16 to 18, wherein the cell adhesion peptide is a peptide in a region relating to cell adhesion in an amino acid sequence of the cell adhesion protein according to claim 19.
21. The solidified preparation according to claim 20, wherein the peptide in a region relating to cell adhesion of fibronectin (FN) protein is a peptide having a specific Arg-Gly-Asp (RGD) amino acid sequence which binds to an integrin receptor on a cell side.
22. The solidified preparation according to claim 21, wherein

the peptide having an RGD amino acid sequence is Tyr-Ala-Val-Thr-Gly-Arg-Gly-Asp-Ser-Pro-Ala-Ser (FIB-1).

23. The solidified preparation according to claim 20, wherein the peptide in a region relating to cell adhesion of laminin (LN) protein is an α -chain G-domain peptide.

24. The solidified preparation according to claim 23, wherein the G-domain peptide is

Arg-Lys-Arg-Leu-Gln-Val-Gln-Leu-Ser-Ile-Arg-Thr (AG73),
Leu-Gln-Gln-Arg-Arg-Ser-Val-Leu-Arg-Thr-Lys-Ile (AG73T),
Thr-Leu-Gln-Leu-Gln-Glu-Gly-Arg-Leu-His-Phe-Met (AG76.8),
Thr-Leu-Gln-Leu-Gln-Glu-Gly-Arg-Leu-His-Phe-Nle (AG76.8X),
Val-Lys-Thr-Glu-Tyr-Ile-Lys-Arg-Lys-Ala-Phe-Met (AG81.2),
Val-Lys-Thr-Glu-Tyr-Ile-Lys-Arg-Lys-Ala-Phe-Nle (AG81.2X),
Lys-Asn-Arg-Leu-Thr-Ile-Glu-Leu-Glu-Val-Arg-Thr (A2G73),
Lys-Pro-Arg-Leu-Gln-Phe-Ser-Leu-Asp-Ile-Gln-Thr (A3G72),
Lys-Phe-Leu-Glu-Gln-Lys-Ala-Pro-Arg-Asp-Ser-His (A4G73),
Gly-Glu-Lys-Ser-Gln-Phe-Ser-Ile-Arg-Leu-Lys-Thr (A4G78),
Thr-Leu-Phe-Leu-Ala-His-Gly-Arg-Leu-Val-Phe-Met (A4G82),
Thr-Leu-Phe-Leu-Ala-His-Gly-Arg-Leu-Val-Phe-Nle (A4G82X),
Gly-Pro-Leu-Pro-Ser-Tyr-Leu-Gln-Phe-Val-Gly-Ile (A5G71),
Arg-Asn-Arg-Leu-His-Leu-Ser-Met-Leu-Val-Arg-Pro (A5G73),
Arg-Asn-Arg-Leu-His-Leu-Ser-Nle-Leu-Val-Arg-Pro (A5G73X),
Leu-Val-Leu-Phe-Leu-Asn-His-Gly-His-Phe-Val-Ala (A5G77),
Leu-Val-Leu-Phe-Leu-Asn-His-Gly-His (A5G77f),
Lys-Asn-Ser-Phe-Met-Ala-Leu-Tyr-Leu-Ser-Lys-Gly (hA3G75) or
Gly-Asn-Ser-Thr-Ile-Ser-Ile-Arg-Ala-Pro-Val-Tyr (hA3G83).

25. The solidified preparation according to claim 20, wherein

the cell adhesion peptide is a peptide comprising 3 to 20 amino acid residues.

26. A method for producing a solidified preparation wherein a functional group, which is capable of reacting to a protein or a peptide, of a hydrophobic binding-adsorptive polymer coated on a cell culture substrate reacts to a cell adhesion protein or peptide.

27. A method for producing a solidified preparation wherein a functional group, which is capable of reacting to a protein or a peptide, of a hydrophobic binding-adsorptive polymer reacts to a cell adhesion protein or peptide, and a cell culture substrate is coated with the reactant.

28. A reactant obtained by reacting a functional group, which is capable of reacting to a protein or a peptide, of a hydrophobic binding-adsorptive polymer, to cell adhesion proteins or peptides.

29. An artificial tissue prepared by seeding a desired cell on the solidified preparation of a cell adhesion protein or peptide according to any one of claims 16 to 27, and culturing the cell.

30. The artificial tissue according to claim 29, wherein the desired cell is an epithelial cell, an endothelial cell or a mesenchymal cell.

31. The artificial tissue according to claim 30, wherein the epithelial cell is an epidermal cell, a corneal epithelial cell,

an alveolar epithelial cell, a mucosal epithelial cell of digestive system, a renal glomerular epithelial cell or a hepatic parenchymal cell.

32. The artificial tissue according to claim 30, wherein the endothelial cell is a renal glomerular ciliated cell, a vascular endothelial cell, a pulmonary arterial vascular endothelial cell, a placental venous vascular endothelial cell or an aortic endothelial cell.

33. The artificial tissue according to claim 30, wherein the mesenchymal cell is a muscle cell, an adipocyte, a glial cell, a Schwann cell or a neural cell (neuron).

34. The artificial tissue according to any one of claims 29 to 33, wherein the artificial tissue is an artificial epidermal tissue, an artificial corneal epithelial tissue, an artificial alveolar epithelial tissue, an artificial respiratory epithelial tissue, an artificial renal glomerular tissue, an artificial hepatic parenchymal tissue or an artificial vascular endothelial tissue, or an artificial blood vessel, an artificial lung, an artificial liver, an artificial kidney, an artificial skin or an artificial cornea.